G. R. S. App. F. IX-4]

1943-44

W File No. 110-43.

Previous References.
W 22-43-4

(War)

Serial Nos. 1 & 2.

Later References.

P/5

GENERAL AND REVENUE SECRETARIAT

Serial Nos. Two only

Part B for November 1943

SUBJECT.

Lighting in industry for war production in India

T.N.Krishnamurti
18.XI.43.

915/W.
Continuation Sheet.

Lighting in Industry for war production

W File No. Current No. 110

of 1 in this Page.

#3-44.

Date 2.11.43
No. 2523

1 From The Secy to the Treasury & Resident. F. 3(18)42/W d 11th Octr 43 forwg copies of Labour Dept Memorandum with enclosures for distribn to the Classified factories as regards the co-operation of the staff in the matter.

Subd for perusal. If approved 9 copies of the Labour Dept Memorandum with enclosures will be sent to the Cl'd factories for distribution to the factories concerned and he will be requested to see that the recommendations are adopted as far as possible. Recently Rule 80A re: Power to provide lighting arrangements in factories has also been adopted by this Govt.

Action as at A. may be taken

Yes
WD

4/10

Wing Cdr)

Min Edn) WD 2/11/43

3/11

WD
3/11

Subd with a draft to the Cl'd factories

Issues 854/W d 4th Nov. 43 to the Cl'd factories

TYPING SECTION
3 NOV. 1943
GEN. & PTY.

B
4/11

The reply to this communication should be addressed to the Secretary to the Resident in Mysore, Bangalore, by designation and not by name.

W 110-43-1

915

No. F.3(18)-42/W.

(with 10 Copies)

FROM

THE SECRETARY TO THE HON'BLE THE RESIDENT IN MYSORE.

To

The Chief Secretary to the Government of
His Highness the Maharaja of Mysore,
Bangalore.

War Dev Dept ARP 12 OCT. 1943 GOVT. OF MYSORE

Dated Bangalore, the 11th October, 1943.

Lighting in Industry for
war production in India.

- - - - -

SIR,

I am directed to forward 10 copies of the Government of India (Department of Labour) memorandum No.ARPI-2H, dated the 31st July 1943, with enclosures, for distribution to the classified factories noted in the margin.

1. Hindustan Aircraft Ltd., Bangalore.
2. Bangalore Woollen, Cotton and Silk Mills Company, Ltd., Bangalore.
3. Bhadravati Iron and Steel Works, Bhadravati.
4. Government Electric Factory, Bangalore.
5. Government Porcelain Factory, Bangalore.
6. Kaisari-Hind Woollen, Cotton & Silk Mills, Ltd., Hebbal, Bangalore.
7. Mysore Chemicals and Fertilisers Ltd., Belagula, Mysore.
8. Mysore Government Silk Weaving Factory, Mysore.
9. Sandalwood Oil Factory, Mysore.

2. I am to request that the Government of Mysore will be so good as to co-operate in the matter, and so far as is possible, adopt the recommendations contained in the Essential Services Officer's report.

I have the honour to be,
Sir,
Your most obedient servant,

A. N. Bose

SECRETARY TO THE RESIDENT.

GOVERNMENT OF INDIA.
DEPARTMENT OF LABOUR

No. ARPI-2H. Dated New Delhi, the 31st July 1943.

M E M O R A N D U M

The undersigned is directed to forward herewith a copy of a report by the Essential Services Officer (Mr.W.A.Ives) attached to the office of the Chief Adviser, Factory A.R.P. on Lighting in Industry for War Production in India and will be grateful for your comments on his proposals at an early date.

The Essential Services Officer is an expert with special knowledge of lighting problems in factories lent to us by His Majesty's Ministry of Supply. It will be seen that, in his opinion, the standard of lighting in general use in factories in this country falls below the minimum it is necessary to maintain in the interests both of the workers and of mixiumum production and that this applies, in a number of cases, not only to night work but to day time production also. One of the biggest difficulties to be faced is the shortage of materials necessary to provide adequate and efficient lighting arrangements and it is obviously of the first importance that the available materials are put to the best possible use and that every poossible source of supply exploited to the maximum.

Mr. Ives makes concrete recommendations which, if adopted, would lead to an improvement in the present situation and an increased output of war supplies. The undersigned is to ask for confirmation of your willingness to co-operate in working the scheme he has suggested

(Sd.) G. PEACE
Deputy Secretary to the
Government of India.

To.....

To,

The Civil Defence , Supply, Finance, War, War Transport, Home, Post & Air, Education, Health & Lands, Industries & Civil Supplies and External affairs Departments; the Railway Deptt. (Railway Board); Central Board of Revenue; Director General of Posts & Telegraphs, The DiG.I.B.,G.C.E. the Esin-G8s Branch; the Q.M.G.Branch; the War Resources Committee; Electrical Commissioner with the Govt. of India, the Joint Secretary, munitions Production, Calcutta; the Deputy Director General of Armaments Production; the Director of Factory Expansion (H.P.Directorate); the Chief Engineer factories (H.P.Directorate); the Vehicles, Timber, Textile Clothing and Leather Directorates (D.G.Supply); the Director of Electric Engineering (H.P.Directorate); the Deputy Director General (Co-ordination), Supply Department; Lt.Col. G.H.Christie, A.R.P. Adviser (H.P.Directorate); the Director General, Ship Repairs and Ship Building, Reserve Bank Building, Mint Road, Bombay; the Additional Finance Adviser (Supply Finance); the Deputy Chief Adviser, Factory A.R.P., Calcutta and Deputy Adviser, Factory A.R.P., Coimbatore.

- - -

CSR
40/17-9-43/D

GOVERNMENT OF INDIA.
DEPARTMENT OF LABOUR.

Office of the Chief Adviser, Factory A.R.P.

LIGHTING IN INDUSTRY FOR WAR-PRODUCTION IN INDIA.

A comparison of existing factory lighting in India with that in the United Kingdom accompanied by certain recommendations for Indian Factories.

Importance of seeing:-

1. The sense of vision is the fundamental human faculty; most impressions reaching the consciousness are associated with, interpreted or originated by a visual concept.

2. Almost without exception the manifold tasks in industry depend for their execution upon the visual senses of the workers.

Industrial Lighting in the United Kingdom.

1. The vital importance of adequate lighting in factories is emphasised in the reports of the House of Commons Select Committee on National Expenditure, established to prevent waste of money in the prosecution of the war, which points out that - "the interior lighting of factories and workshops should be the subject of full and urgent investigation as eyestrain is one of the major causes of industrial fatigue". - "at the beginning of the war, factory conditions deteriorated seriously because of the arrangements necessary for the screening of lights" - "the cost of labour and materials in making the necessary improvements (to lighting) may be far outweighed by the resulting increase in output."

2. The Departmental Committee on Lighting in Factories was recalled soon after the commencement of the war to report on conditions resulting from the war. Their 5th report published in June 1940, drew attention to the means of preventing emission of light at the commencement of the war for purposes of compliance with the Lighting Restrictions Order, as being hastily improvised and consisting mainly of the application of black paint or other opaque material to windows. This caused not only permanent and complete elimination of daylight but also prevented the opening of windows at night resulting in poor ventilation and producing conditions which, particularly where hot processes were carried on, were often intolerable.

3. Later the disadvantages in this method became realised and there followed an increasing tendency to employ systems of shutters or blinds affording admission of daylight while preventing emission of light after dark.

4. Some factories however remained permanently obscured, generally due to difficulties associated with camouflage design or to exceptional structural height or to difficulties connected with the control of shutters or blinds.

5. Ventilation difficulties were met by adopting mechanical means or by using ventilation light-traps.

6. Attention was drawn to the altered conditions of work. Work is done at high pressure and a much greater strain imposed upon the worker. Owing to the prevalence of night work and overtime, the time spent under artificial light is much longer. In peace time the artificial light was used for about 10 to 15 per cent of yearly hours of employment; in war time it is often 50 to 100 per cent.

7. The Committee stated they had been unable to find any evidence that "prolonged or continuous work under artificial light has any deleterious effects upon health or safety". It is obvious, however, that the present (war-time) conditions of work, especially in factories completely obscured are unnatural and new to the majority of workers and that exposure to such conditions justifies the

maintenance of a higher standard of illumination than previously recommended (in the 4th report), in the interests both of the workers and of increased production".

8. An illumination of one foot-candle at floor level as recommended in the 4th report could no longer be regarded as generally adequate and it was desirable to lay down a standard enabling ordinary work to be done with ease and affording reasonable amenity to the workers. The Committee accordingly recommended that a minimum illumination of 6 f.c. measured on a plane 3 feet above the floor (normal average working plane) should be attained, over areas where workers are regularly employed. Precautions against the incidence of glare were cited, and the importance of light coloured interior walls emphasized. Reference was made to the code of illumination values published by the Illuminating Engineering Society, as representing generally accepted good practice for values of illumination required for particular tasks.

Lighting Legislation in the U.K.:-

1. The demand for lighting legislation is of old origin. It was first made 33 years ago by Prof. Thompson, the then President of the Illuminating Engineering Society.

2. In 1911 the Departmental Committee on Accidents in Workshops recommended that general statutory powers to require adequate lighting should be conferred on the Home Office. In 1913 the Departmental Committee on Lighting in Factories and Workshops made a similar proposal. Reports were issued in 1915, 1921, 1922 and 1938 by the Departmental Committee on Lighting in Factories and Workshops.

3. It was not until 1937 that requirements were at length introduced into the Factories Act. The Home Office Factory Department had undertaken much patient work to pave the way for ultimate legislation. "Procedure typical of the traditions of the country, where the issue of rules and regulations is often deferred until a belief they will operate for the benefit of those upon whom they are imposed has been firmly established."

4. Regulations under the Factories Act and based upon the 5th Report of the Departmental Committee on Lighting in Factories and Workshops, were brought into force in January 1941 (See Annex.I.)

War Production Lighting in the U.K. :-

1. In August 1940, the three Services Ministries - Admiralty, Aircraft Production and Supply - issued instructions to all their factories under the Ministry of Supply Act 1939, to the effect that all working areas engaged upon war-production were to be provided with artificial lighting conforming to the standards given by the Illuminatin Engineering Society's Code. Suitability and avoidance of glare clauses corresponding to the recommendations of the 5th Report of the Departmental Committee on Lighting in Factories and Workshops, were included in a technical memorandum circulated to all factories.

2. The United Kingdom Government at first afforded a grant of 35% of the capital costs incurred by improvements to lighting. This was later adjusted, with retrospective effect, to a sliding percentage which was based upon the proportion of government/civil orders upon which the individual firms were engaged, less a fixed amount to allow for the cost of compliance with the minimum illumination required by the Factories (Standards of Lighting) Regulations. The majority of workshops, in order to conform to the Illuminating Engineering Society's Code and thereby to provide lighting sufficient for the work, installed greater values of illumination than they were obliged to do under the Factories (Standards of Lighting) Regulations. The proportion of the capital costs assisted by the government under this arrangement was from 60 to 70 per cent.

3. 3. The illumination values over working areas resulting from the requirements of the Services Ministries were to the following general order:-

P.T.O.

owing to obstruction of natural light by heavy plant, overhead drives, dark-coloured interior surfaces and unsuitable structure. (Annexure II gives brief details of the lighting in a number of factories).

Lighting Legislation in India.

1. The Factories Act, 1934, modified in August 1937, under section 18(1) states that a factory shall be sufficiently lighted during all working hours. Sub-section (ii) gives the Inspector powers to serve an order specifying improvements which in his opinion should be adopted. Under sub-section (iii) the Provincial Govt. may make rules requiring that all factories of specified classes shall be lighted in accordance with prescribed standards.

2. No regulations are known to have been issued under sub-section (iii) and there is apparently no guidance afforded to the Factory Inspector to enable him to form a judgement.

3. It is to be observed that while Provincial Govts. possess powers to issue rules, the pace of the machinery for implementing these powers is inconsistent with the urgency imposed by the war - it is anticipated for example that particular delay would occur in attaining agreement to common standards. This must be avoided and it is strongly recommended that the work be carried out by issue of Orders to prescribed standards under the Defence of India Rules thus permitting war-production factory-lighting to be improved in uniform measure immediately. The experience gained will constitute valuable guidance to Provincial Govts. when legislation is deliberated after the war.

Government Interest in Industrial Lighting.

1. During peace time government interest is mainly associated with labour welfare aspects. In war-time it has an interest which also embraces the direct and indirect effects upon production. This involves both the welfare or amenity-value requirements and the physical requirements of the visual tasks: the former concerns the conditions influencing the workers' will to work; the latter, the basic requirements of lighting for the proper execution of a given task.

Recommendations for Industrial Lighting in India.

1. The following recommendations are based upon the assumption that Government of India desires to assure the attainment of all conditions which will aid butturn of war supplies. It is to be emphasized that improvements to lighting are necessary not only to enable night-work to be fully effective but also to assist daytime production.

2. It is recommended therefore that Government associates itself with a campaign for the attainment of the lighting in industry which is essential for the realisation of full production. Government can do this by (a) the issue of Orders under the Defence of India Rules; (b) the establishment of consistent lighting practice by the issue of prescribed standards; (c) obtaining the necessary materials by issue of priorities and release of controlled materials such as steel, the importing of non-indigenous materials, and the expansion of lighting equipment manufacturing facilities in India; (d) affording financial assistance to the war-production factories by means of a grant contribution to the capital costs, or alternatively by permitting factories to recover costs in accordance with the established procedure for A.R.P. expenditure.

3. The magnitude of the work entailed may be conveyed by consideration of the following:-

(i) The difficulties of the supply of materials position render it essential to employ all possible methods of economy and to ensure that available materials are put to the best possible use. It is not the intention therefore to undertake lighting improvements in all factories engaged on war-production nor in any event is this necessary for apart from those factories already possessing

Heavy Engineering Shops	= 6-10	foot-candles.
Machine Shops	=10-15	" "
Tool Rooms	=15-25	" "
Drawing Offices	=25-50	" "
Aircraft Assembly	=25-50	" "

The average capital cost of adequate lighting per factory employing 300-1,000 personnel was (in 1942) of the order of £1,400/- (or Rs.18,600/-

Organization of Lighting Industry in U.K.

1. In order to deal effectively with the national demands for lighting equipment during the war, a Joint Lighting Committee was formed on which was represented Lamps, Reflectors, Cables, Switchgear and Accessories Manufacturers, Installation Contractors, Electric and Gas Supply undertakings.

2. A number of Working Sub-Committees were formed to deal with lighting practice, economy measures, wiring problems, employment of expert personnel.

3. The Expert Lighting (Planning) Engineers were directed to the factories where their services could most usefully be employed, through a rota system operated under the aegis of Joint Lighting Committee.

4. Due to the initiative of the industry and with the support of the government, supply of equipment problems were overcome and the maximum use made of all resources.

Industrial Lighting in India.

1. In developing and expanding industrial resources in India to meet war-production requirements, the importance of lighting appears have been overlooked. This does not mean that it has been ignored for a few factories and industrial groups have given it worthwhile attenti Probably the Ordnance Factories and Railway Workshops, as groups, are best equipped, although individually some of these factories are badly served. And those factories situated in areas where lighting restrictions regulations are in force, in general, have reduced or otherwise curbed the effectiveness of their lighting.

2. Lighting as an essential accompaniment to war-production i India has not received the government support that was manifested in the U.K., while the Lighting Industry in India evinces little of the strength or initiative displayed to such national advantage, by its counterpart in the U.K. These two factors together with the lack of 'Light-consciousness' in war-production industry itself are probabl mainly accountable for the present position.

3. In peace time Indian Factories seldom had need to resort to artificial lighting other than to augment deficient day-lighting, and consequently their artificial lighting systems on average are incapable of providing the standards required by night-work and the greater use of plants under war-conditions.

4. The advent of Lighting Restrictions Regulations in India caused teething difficulties similar to those in the U.K. There is now developing an appreciation of the logical methods of complying wi lighting restrictions, but many factories still ensure their complian by severely curtailing production lighting. Methods in common use ar painting reflectors black, reducing lamp sizes, heavily skirting reflectors with black painted metal cylinders, lowering the heights of reflectors, exclusive use of unscreened local lights close to the machines all of which cause diversity of illumination, acute shadows and glare, and particularly in heavy engineering shops result in conditions which are conducive to accidents. The foregoing methods superimposed upon lighting systems which in any event are inadequate characterise the majority of the after-dark production lighting in the vital Calcutta Industrial Area.

5. Even during daylight certain workshops are badly lighted

satisfactory lighting, only a proportion of the 900 factories in Supply Department's Class I List are engaged upon processes which are sufficiently dependent upon adequate lighting to justify improvements at the present time. Engineering Works in general are the most important in this sense. It should not be assumed that adequate standards of light are unnecessary in such important industries as Cotton, Wool, Jute, Food, Chemical and Printing; but the exigencies of war-requirements and shortage of lighting equipment appear to dictate the degree of selective priority exemplified by the foregoing proposal.

(ii) An approximate estimate is that about 200 Engineering Factories in India, require improved lighting at a capital cost of Rs. 57 lakhs (based upon the average cost per factory in the U.K. of £.1,400/- plus a 50% allowance for higher costs in India).

(iii) in order to meet the difficulties of the supplies-of-light-equipment position it is essential to obtain a comprehensive assessment of the materials likely to be required, and to order in bulk, making appropriate allowances for spares. Unless Government is prepared to become the purchaser for this equipment supplying the factories and recovering costs from them in similar fashion to that adopted for the larger part of A.R.P. equipment, the responsibility for financing the purchase becomes the obligation of those private firms who are normal dealers in lighting supplies. It is extremely unlikely that these firms will accept such an obligation without some assurance of a market. The foregoing objection should be overcome by the use of powers under the Defence of India Rules by which war production factories may be ordered by Government to install lighting to prescribed standards, thereby establishing a demand for the equipment.

(iv) It is proposed that the lighting standards be based upon.....

upon the U.K. Factories (Standards of lighting) Regulations 1941 and upon the Code of Illumination Values published by the Illuminating Engineering Society of Great Britain, the latter representing normal average good lighting practice as accepted in the U.K. (see pages 40, 41 & 42 of "A Summary of Air Raid Precautions applied to Factories" 3rd Edition and Annex. 1).

(v) For purposes of accurate, suitable and economical preparation of lighting schemes in vital factories it is highly important that the problems be dealt with by Engineers skilled in lighting practice and possessing Electrical Engineering experience. There are very few such men in India at the present time; certainly they are insufficient to permit the estimated programme to be dealt with in a short time. As it is preferable on administrative and practical grounds for the Lighting Engineers to be members of the staff of the Lighting Equipment Merchandizing Firms and as these firms are particularly lacking in this respect, it is suggested that government may be prepared t sponsor the release of say 6 of these Engineers from the parent firms in the U.K. for service with their firms in India. Failing this Government of India with the nucleus of Light Engineers already attached to the Chief Adviser, Factory A.R.P., Labour Department, might set up a Lighting Organization whose responsibility would be the suitable lighting of factories for benefit of war-production. Young engineers in India could be brought into the organization and trained in the technique of modern lighting practice with immediate and future advantage to India's expanding industry.

SNB 17.9.1943.
40 Copies D.

Annexure I.

("LIGHTING IN INDUSTRY FOR PRODUCTION IN INDIA")

STATUTORY RULES AND ORDERS 1941 No.94

FACTORIES.

The Factories (Standards of Lighting) Regulations, 1941, dated January 14, 1941, made by the Minister of Labour and National Service under section 5 of the Factories Act, 1937 (I E D W 8 and 1 GEO. 6.c.67) prescribing a Standard of Lighting for certain Factories.

In pursuance of section 5(2) of the Factories Act, 1937, and of all other powers enabling him in that behalf, the Minister of Labour and National Service hereby makes the following Regulations:-

1. Subject as in these Regulations provided, these Regulations shall apply to factories in which persons are being regularly employed in a process or processes for more than 48 working hours a week, or in shifts, provided that nothing in these Regulations shall be deemed to require the provision of lighting of a specified standard in any building or structure so constructed that it would not be reasonably practicable to comply both with such requirement and with any defence requirement as to the non-display or obscuration of lights.

2. (a) The general illumination over those interior parts of the factory where persons are regularly employed shall be not less than 6 foot-candles measured in the horizontal plane at a level of 3 feet above the floor:-

Provided that in any such parts in which the mounting height of the light sources for general illumination necessarily exceeds 25 feet measured from the floor or where the structure of the room or the position or construction of the fixed machinery or plant prevents the uniform attainment of this standard, the general illumination at the said level shall be not less than 2 foot-candles, and where work is actually being done the illumination shall be not less than 6 foot-candles or the greatest reasonably practicable illumination below 6 foot-candles.

(b) The illumination over all other interior parts of the factory over which persons employed pass shall when and where a person is passing be not less than 0.5 foot-candles measured at floor level.

(c) The standards specified in this regulation shall be without prejudice to the provision of any additional illumination required to render the lighting sufficient and suitable for the nature of the work.

3. (a) Where any source of artificial light in the factory is less than 16 feet above floor level, no part of the source or of the lighting fitting having a brightness greater than 10 candles per square inch shall be visible to persons whilst normally employed within 100 ft. of the source, except where the angle of elevation from the eye to the source or part of the fitting, as the case may be, exceeds 20^{0}.

(b) Any local light, that is to say an artificial light designed to illuminate particularly the area or part of the area of work of a single operative or small group of operatives working near each other, shall be provided with a suitable shade of opaque material to prevent glare or with other effective means by which the light source is completely screened from the eyes of every person employed at a normal working place, or shall be so placed that no such person is exposed to glare therefrom.

(c) So far as reasonably practicable, arrangements shall be made, by suitable screening or placing or other effective method, to prevent discomfort or injury by the reflection of light from smooth or polished surfaces into the eyes of the worker.

4. Adequate measures shall be taken, so far as reasonably practicable to prevent the formation of shadows which cause eye-strain or risk of accident to any person employed.

P.T.O.

5. (a) Where the Chief Inspector of Factories is satisfied in respect of any particular factory or part thereof or in respect of any description of workroom or process that any requirement of these regulations is inappropriate or is not reasonably practicable, he may by certificate in writing (which he may at his discretion revoke) exempt the factory or part thereof or description of workroom or process from such requirement to such extent and subject to such conditions as he may specify in the certificate.

(b) Regulation 2(a) shall not apply to the factories or parts of factories respectively specified in Part I of the Schedule to this Order, and nothing in Regulation 2 shall apply to the parts of factories specified in Part II of the said Schedule.

6. These Regulations may be cited as the factories (Standards of Lighting) Regulations, 1941, and shall come into force on the first day of February, 1941.

Signed by Order of the Minister of Labour and National Service this fourteenth day of January, 1941.

(Sd.) T.W. PHILLIPS

Secretary of the Ministry of Labour and National Service.

S C H E D U L E

PART I.

Cement Works.
Lime, whiting and plaster works.
Works for the crushing and grinding of limestone.
Gas works.
Coke oven works.
Electrical stations.
Flour mills.
Provender and compound food mills.
Maltings and breweries.
Parts of factories in which the following are carried on:-

Concrete or artificial stone making.
The making of tar-macadam or other road materials.
The conversion of iron into steel.
The smelting of iron ore.
Iron or steel rolling.
Hot rolling or forging, tempering or annealing of metals.
Glass blowing and other working in molten glass.
Tar distilling.
Petroleum refining and blending.
Extraction of petrol from shale oil.

P A R T II.

Parts of factories in which light sensitive photographic materials are made or used in an exposed condition.

MEHTA/17-9-43
40 copies.D.

ANNEXURE II.

("LIGHTING IN INDUSTRY FOR WAR-PRODUCTION IN INDIA")

EXAMPLES OF EXISTING LIGHTING IN INDIAN FACTORIES.

1. Metal & Steel Factory, Ishapore.

In Machine Shops, inadequate daylight partly due to poor disposition of windows and partly to obscuration plus camouflage. Considerable obstruction to daylight by overhead-drive gear and very little assistance from surrounding interior surfaces owing to dark colour of latter. Artificial lighting inadequate-insufficient number of general lighting points and lamp sizes too small.

Requires considerable improvement to artificial lighting and investigation into methods of improving daylight.

2. Ordnance Clothing Factory, Calcutta.

Good daylight of which full use is made. But artificial lighting points consist of obsolete conical metal reflectors conducing to much glare; mounting height insufficient, spacing excessive and lamp sizes inadequate. Artificial lighting requires adjustment and augmentation to ensure conformity with up-to-date good practice.

3. Burn & Co. Ltd., Howrah Iron Works, Howrah.

Daylighting, fortuitously, is good, owing to the nature of the open-sides workshops. Firm drastically curtailed existing artificial lighting by heavily screening the reflectors in order to comply with lighting Restrictions. But existing artificial lighting in any event is generally much below requirements. Where the quantity of light (in the only instance) was observed to be adequate, the mounting height of reflectors is insufficient and lamps are too large for reflectors, the combination resulting in acute glare sensation. The general nature of the work (heavy engineering) results in considerable obstruction and there is much shadow. Workers in some shops realize the deficiency of light and, in the endeavour to obtain more have misguidedly removed the reflectors thus creating glare and actually causing adverse lighting conditions.

Considerable improvement to and rationalization of methods of artificial lighting required if this important factory is to contribute its full quota from night work.

4. Jay Engineering Works, Calcutta.

Daylighting good. Interior walls whitewashed, considerably aiding seeing conditions. But artificial lighting consists of bare lamps hung over machines in close proximity to workers, resulting in acute glare and insufficient light on the work.

Requires reflectors fitted to all local lamps and new general lighting.

5. Jamalpur Railway Workshops (E.I.R.), Bihar.

Northlight construction of shops gives good daylight. Layout of artificial lighting system is regular and at good height resulting in reasonably uniform distribution but the value of illumination is inadequate, particularly on machines. Augmentation of existing artificial lighting required.

6. B. & A. Railway Workshops, Kanchrapara.

Daylight is good. Artificial lighting system in general is regularly planned and full advantage taken of available height in shops. Machine Shop & Tool Room lighting is inadequate in volume and the distribution of reflectors not

entirely

entirely suited to the work.

Augmentation of existing artificial lighting required.

7. Calcutta Port Commissioners' Workshops.

Daylight is restricted owing to permanent obscuration of rooflights. Artificial lighting has been severely restricted for compliance with lighting restrictions. In any event artificial lighting system inadequate.

New general lighting system required and methods of improving daylight should be investigated.

8. Maya Engineering Works, Calcutta.

Daylight poor owing to lack of rooflights and to the screening of partly open sides of shop for purpose of compliance with lighting restrictions. Artificial lighting extremely poor, consisting of bare lamps hung over machines.

New artificial lighting installation required coupled with study of methods for improving daylight.

9. Garden Reach Workshops of McNeill & Co., Calcutta.

Daylight of extremely low standard owing to smoky atmosphere, dark interior surfaces and dirt on northlight windows. Further loss of daylight in some bays due to black-paint applied to northlight windows for purpose of obscuration. Artificial lighting required constantly during hours of work.

Artificial lighting quite inadequate for the work. Requires new artificial lighting.

* * *

Pew
40-17/9/43-D.

Appendix F. G.—1]

SUBJECT.....

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Section War

File No. 110-43

Serial No. 2.

Diary No. of letter replied to 915

No. W.854. Encls.

To Chief Inspector of Factories

Lighting in Industry for War purposes in India

General and Revenue Secretariat

( )

the *194*

Sir,

I am directed to enclose herein a copy of Govt letter of 11th Oct. 43 with 9 copies of the Labour Dept Memorandum of 31st July 43 as enclosures for distribution to the factories concerned and to request you kindly to send the Consolidated Service Officers report on action taken by the factories so far as is possible.

Date of issue... 4-11-43

Signed by... Please see copy

the recommendations

List of enclosures.....

Copied by...

4/11

Examined by...

I have the honour to be,
Sir,
Your obedient servant,
for Chief Inspector of Factories

WD 04161—GPB—60,000—24-10-41